



DEPARTMENT OF THE AIR FORCE
59TH MEDICAL WING (AETC)
JOINT BASE SAN ANTONIO - LACKLAND TEXAS



8 MAY 2017

MEMORANDUM FOR SGO3D
ATTN: CAPT PATRICK NG

FROM: 59 MDW/SGVU

SUBJECT: Professional Presentation Approval

1. Your paper, entitled **Sodium Azide Associated Acute Hyperkalemia in a Swine Model of Sodium Azide Toxicity** presented at/published to **SURF, San Antonio, TX, 16 June 2017** in accordance with MDWI 41-108, has been approved and assigned local file #**17228**.
2. Pertinent biographic information (name of author(s) title, etc.) has been entered into our computer file. Please advise us (by phone or mail) that your presentation was given. At that time, we will need the date (month, day and year) along with the location of your presentation. It is important to update this information so that we can provide quality support for you, your department, and the Medical Center commander. This information is used to document the scholarly activities of our professional staff and students, which is an essential component of Wilford Hall Ambulatory Surgical Center (WHASC) internship and residency programs.
3. Please know that if you are a Graduate Health Sciences Education student and your department has told you they cannot fund your publication, the 59th Clinical Research Division may pay for your basic journal publishing charges (to include costs for tables and black and white photos). We cannot pay for reprints. If you are a 59 MDW staff member, we can forward your request for funds to the designated Wing POC at the Chief Scientist's Office, Ms. Alice Houy, office phone: 210-292-8029; email address: alice.houy.civ@mail.mil.
4. Congratulations, and thank you for your efforts and time. Your contributions are vital to the medical mission. We look forward to assisting you in your future publication/presentation efforts.

LINDA STEEL-GOODWIN, Col, USAF, BSC
Director, Clinical Investigations & Research Support

| PROCESSING OF PROFESSIONAL MEDICAL RESEARCH/TECHNICAL PUBLICATIONS/PRESENTATIONS | | | |
|---|---|--|---|
| 1. TO: CLINICAL RESEARCH | 2. FROM: (Author's Name, Rank, Grade, Office Symbol) Patrick Ng / Capt / O-3 / 59th EMDs/SGO3D | 3. GME/IGHSE STUDENT: <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO | 4. PROTOCOL NUMBER: FWH20150073A |
| 5. PROTOCOL TITLE: (NOTE: For each new release of medical research or technical information as a publication/presentation, a new 59 MDW Form 3039 must be submitted for review and approval.) Intravenous versus intramuscular cobinamide compared to intravenous saline (control) or hydroxocobalamin in the treatment of acute, survival | | | |
| 6. TITLE OF MATERIAL TO BE PUBLISHED OR PRESENTED: Sodium azide associated acute hyperkalemia in a swine model of sodium azide toxicity | | | |
| 7. FUNDING RECEIVED FOR THIS STUDY? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO FUNDING SOURCE: SG5 O&M | | | |
| 8. DO YOU NEED FUNDING SUPPORT FOR PUBLICATION PURPOSES: <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO | | | |
| 9. IS THIS MATERIAL CLASSIFIED? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO | | | |
| 10. IS THIS MATERIAL SUBJECT TO ANY LEGAL RESTRICTIONS FOR PUBLICATION OR PRESENTATION THROUGH A COLLABORATIVE RESEARCH AND DEVELOPMENT AGREEMENT (CRADA), MATERIAL TRANSFER AGREEMENT (MTA), INTELLECTUAL PROPERTY RIGHTS AGREEMENT ETC.? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO NOTE: If the answer is YES then attach a copy of the Agreement to the Publications/Presentations Request Form. | | | |
| 11. MATERIAL IS FOR: <input checked="" type="checkbox"/> DOMESTIC RELEASE <input type="checkbox"/> FOREIGN RELEASE CHECK APPROPRIATE BOX OR BOXES FOR APPROVAL WITH THIS REQUEST. ATTACH COPY OF MATERIAL TO BE PUBLISHED/PRESENTED. | | | |
| <input type="checkbox"/> 11a. PUBLICATION/JOURNAL (List intended publication/journal.) | | | |
| <input type="checkbox"/> 11b. PUBLISHED ABSTRACT (List intended journal.) | | | |
| <input checked="" type="checkbox"/> 11c. POSTER (To be demonstrated at meeting: name of meeting, city, state, and date of meeting.) SURE, San Antonio TX, June 16, 2017 | | | |
| <input type="checkbox"/> 11d. PLATFORM PRESENTATION (At civilian institutions: name of meeting, state, and date of meeting.) | | | |
| <input type="checkbox"/> 11e. OTHER (Describe: name of meeting, city, state, and date of meeting.) | | | |
| 12. HAVE YOUR ATTACHED RESEARCH/TECHNICAL MATERIALS BEEN PREVIOUSLY APPROVED TO BE PUBLISHED/PRESENTED? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO ASSIGNED FILE # 17108 DATE 27Feb2017 | | | |
| 13. EXPECTED DATE WHEN YOU WILL NEED THE CRD TO SUBMIT YOUR CLEARED PRESENTATION/PUBLICATION TO DTIC NOTE: All publications/presentations are required to be placed in the Defense Technical Information Center (DTIC). | | | |
| DATE Sept 2018 | | | |
| 14. 59 MDW PRIMARY POINT OF CONTACT (Last Name, First Name, M.I., email) Ng, Patrick C. patrick.c.ng.mil@mail.mil | | | 15. DUTY PHONE/PAGER NUMBER 201-336-4407 |
| 16. AUTHORSHIP AND CO-AUTHOR(S) List in the order they will appear in the manuscript. | | | |
| LAST NAME, FIRST NAME AND M.I. | GRADE/RANK | SQUADRON/GROUP/OFFICE SYMBOL | INSTITUTION (If not 59 MDW) |
| a. Primary/Corresponding Author Ng, Patrick C. | Capt | 59th EMDs/SGO3D | |
| b. Maddry, Joseph K. | Maj | 59th EMD/SGOED | |
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| d. Garrett, Normalynn | CTR | 59th MDW/ST | |
| e. Canellis, Kaysie | CTR | 59th MDW/ST | |
| 17. IS A 502 ISG/JAC ETHICS REVIEW REQUIRED (JER DOD 5500.07-R)? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO | | | |
| I CERTIFY ANY HUMAN OR ANIMAL RESEARCH RELATED STUDIES WERE APPROVED AND PERFORMED IN STRICT ACCORDANCE WITH 32 CFR 219, AFMAN 40-401 JP, AND 59 MDW 41-108. I HAVE READ THE FINAL VERSION OF THE ATTACHED MATERIAL AND CERTIFY THAT IT IS AN ACCURATE MANUSCRIPT FOR PUBLICATION AND/OR PRESENTATION. | | | |
| 18. AUTHOR'S PRINTED NAME, RANK, GRADE Patrick C Ng | | 19. AUTHOR'S SIGNATURE NG, PATRICK C. 1307539629 | 20. DATE May 04, 2017 |
| 21. APPROVING AUTHORITY'S PRINTED NAME, RANK, TITLE William C. Terry, Program Analyst, GS13 | | 22. APPROVING AUTHORITY'S SIGNATURE TERRY, WILLIAM CHRIS 1153589360 | 23. DATE May 04, 2017 |

| PROCESSING OF PROFESSIONAL MEDICAL RESEARCH/TECHNICAL PUBLICATIONS/PRESENTATIONS | | |
|--|--|--|
| 1st ENDORSEMENT (59 MDW/SGVU Use Only) | | |
| TO: Clinical Research Division 59 MDW/CRD Contact 292-7141 for email instructions. | 24. DATE RECEIVED 5 May 2017 | 25. ASSIGNED PROCESSING REQUEST FILE NUMBER 17228 |
| 26. DATE REVIEWED May 08, 2017 | | 27. DATE FORWARDED TO 502 ISGUAC |
| 28. AUTHOR CONTACTED FOR RECOMMENDED OR NECESSARY CHANGES: <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES If yes, give date. _____ <input type="checkbox"/> N/A | | |
| 29. COMMENTS <input checked="" type="checkbox"/> APPROVED <input type="checkbox"/> DISAPPROVED | | |
| | | |
| 30. PRINTED NAME, RANK/GRADE, TITLE OF REVIEWER ANNEKE C. BUSH, GS-14, Clinical Research Administrator | 31. REVIEWER SIGNATURE BUSHANNEKE.C.1040580385 <small>Digitally signed by ANNEKE C. BUSH, GS-14, Clinical Research Administrator DN: cn=BUSHANNEKE.C.1040580385, o=59 MDW, ou=59 MDW, email=BUSHANNEKE.C.1040580385@59mdw.mil</small> | 32. DATE May 08, 2017 |
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| | | |
| 42. PRINTED NAME, RANK/GRADE, TITLE OF REVIEWER Kevin Imuma, SSgt/E-5, 59 MDW Public Affairs | 43. REVIEWER SIGNATURE <small>Digitally signed by KEVIN IMUMA, SSgt/E-5, 59 MDW Public Affairs DN: cn=KEVIN IMUMA, SSgt/E-5, 59 MDW Public Affairs, o=59 MDW, ou=59 MDW, email=KEVIN.IMUMA@59mdw.mil</small> | 44. DATE May 08, 2017 |
| 4th ENDORSEMENT (59 MDW/SGVU Use Only) | | |
| 45. DATE RECEIVED | 46. SENIOR AUTHOR NOTIFIED BY PHONE OF APPROVAL OR DISAPPROVAL <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> COULD NOT BE REACHED <input type="checkbox"/> LEFT MESSAGE | |
| 47. COMMENTS <input type="checkbox"/> APPROVED <input type="checkbox"/> DISAPPROVED | | |
| | | |
| 48. PRINTED NAME, RANK/GRADE, TITLE OF REVIEWER | 49. REVIEWER SIGNATURE | 50. DATE |

Sodium azide associated acute hyperkalemia in a swine model of sodium azide toxicity

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Background

Sodium azide (NaN₃) poisonings are rare but extremely deadly. There is very little in the literature regarding the clinical course of sodium azide poisoning. Virtually all of the information comes from case studies and each of those describe hypokalemia hours after poisoning. Antidotes to cyanide have been used for sodium azide poisonings but have had limited success.

Objective

To describe the clinical course of sodium azide poisoning and develop novel treatments for toxicity.

Methods

Twenty swine (45-55 kg) were anesthetized, intubated, and instrumented with continuous femoral and pulmonary artery pressure monitoring. After stabilization, anesthesia was adjusted such that animals would spontaneously ventilate with an FiO₂ of 0.21. Sodium azide, in concentrations ranging from 4 to 160 mg/mL, was infused at doses ranging from 0.8 to 10 mg/kg/min until apnea was confirmed for 1 minute by capnography. This rate was sustained for 1.5 minutes post apnea. Only doses at 10 mg/kg/min at concentrations of 160 mg/mL produced consistent apnea but not sustained apnea.

Methods cont.

Statistics: Repeated measures ANOVA was used to determine statistically significant changes among groups over time.

Results

There were no significant differences in baseline vital signs, chemistries, or arterial blood gases including potassium (mean 4.1 mEq/L) and lactate (1.1 mmol/L) among the animals. Once the NaN₃ infusion began, all pigs became hyperkalemic, acidotic and hypotensive. In pigs infused with the highest dose and concentration of NaN₃ (n=14), significant hyperkalemia began at apnea (5.1 mmol/L) and continued to rise (mean 7.7 mmol/L) even after the infusion was discontinued. Swine not treated for hyperkalemia died. Those treated with insulin, dextrose 50%, and calcium survived, but demonstrated elevated T waves on electrocardiogram and continued acidosis (lactate mean 6.7 mmol/L).

Table 1. Vital Signs

| | Baseline | Apnea | End of Study |
|------------------|----------|-------|--------------|
| pH | 7.460 | 7.403 | 7.423 |
| pCO ₂ | 41.6 | 50.6 | 43.1 |
| pO ₂ | 96.4 | 39.4 | 70.6 |
| K ⁺ | 4.1 | 4.8 | 6.8 |
| Ca ²⁺ | 1.28 | 1.31 | 1.32 |
| Lactate | 1.1 | 1.5 | 10.5 |

Results Continued

Graph 1. Potassium trends over time in treated vs. non treated animals

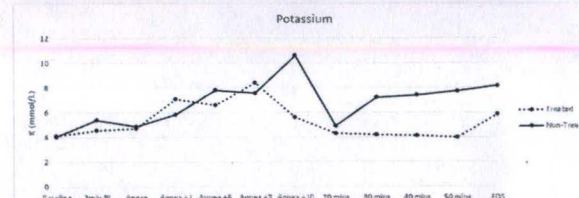
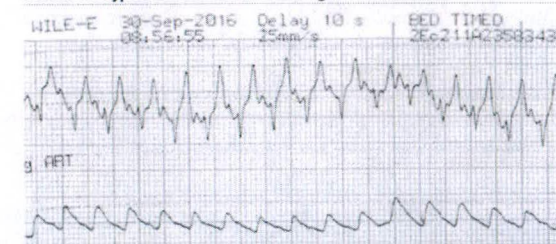


Figure 1. ST elevation in animal #8611. NaN₃ started at 0850 and off at 0853. Treated for hyperkalemia at 0852. ST changes noted at 0856.



Limitations

Infusion, not inhalation model
Animal model

Conclusions

NaN₃-poisoned swine acutely develop hyperkalemia. We speculate that the hyperkalemia is due, in part, to the intracellular exchange of potassium ions for hydrogen ions in the face of metabolic acidosis. Pathology findings in the animals demonstrate that hyperkalemia is not caused by excessive muscle breakdown. Model development is ongoing.

PROCESSING OF PROFESSIONAL MEDICAL RESEARCH/TECHNICAL PUBLICATIONS/PRESENTATIONS

INSTRUCTIONS

USE ONLY THE MOST CURRENT 59 MDW FORM 3039 LOCATED ON AF E-PUBLISHING

1. The author must complete page two of this form:
 - a. In Section 2, add the funding source for your study [e.g., 59 MDW CRD Graduate Health Sciences Education (GHSE) (SGS O&M); SGS R&D; Tri-Service Nursing Research Program (TSNRP); Defense Medical Research & Development Program (DMRDP); NIH; Congressionally Directed Medical Research Program (CDMRP); Grants; etc.]
 - b. In Section 2, there may be funding available for journal costs, if your department is not paying for figures, tables or photographs for your publication. Please state "YES" or "NO" in Section 2 of the form, if you need publication funding support.
2. Print your name, rank/grade, sign and date the form in the author's signature block or use an electronic signature.
3. Attach a copy of the 59 MDW IRB or IACUC approval letter for the research related study. If this is a technical publication/presentation, state the type (e.g. case report, QA/QI study, program evaluation study, informational report/briefing, etc.) in the "Protocol Title" box.
4. Attach a copy of your abstract, paper, poster and other supporting documentation.
5. Save and forward, via email, the processing form and all supporting documentation to your unit commander, program director or immediate supervisor for review/approval.
6. On page 2, have either your unit commander, program director or immediate supervisor:
 - a. Print their name, rank/grade, title; sign and date the form in the approving authority's signature block or use an electronic signature.
7. Submit your completed form and all supporting documentation to the CRD for processing (59crdpubspres@us.af.mil). This should be accomplished no later than 30 days before final clearance is required to publish/present your materials. If you have any questions or concerns, please contact the 59 CRD/Publications and Presentations Section at 292-7141 for assistance.
8. The 59 CRD/Publications and Presentations Section will route the request form to clinical investigations, 502 ISG/JAC (Ethics Review) and Public Affairs (59 MDWPA) for review and then forward you a final letter of approval or disapproval.
9. Once your manuscript, poster or presentation has been approved for a one-time public release, you may proceed with your publication or presentation submission activities, as stated on this form. Note: For each new release of medical research or technical information as a publication/presentation, a new 59 MDW Form 3039 must be submitted for review and approval.
10. If your manuscript is accepted for scientific publication, please contact the 59 CRD/Publications and Presentations Section at 292-7141. This information is reported to the 59 MDWOC. All medical research or technical information publications/presentations must be reported to the Defense Technical Information Center (DTIC). See 59 MDWI 41-108, *Presentation and Publication of Medical and Technical Papers*, for additional information.
11. The Joint Ethics Regulation (JER) DoD 5500.07-R, *Standards of Conduct*, provides standards of ethical conduct for all DoD personnel and their interactions with other non-DoD entities, organizations, societies, conferences, etc. Part of the Form 3039 review and approval process includes a legal ethics review to address any potential conflicts related to DoD personnel participating in non-DoD sponsored conferences, professional meetings, publication/presentation disclosures to domestic and foreign audiences, DoD personnel accepting non-DoD contributions, awards, honoraria, gifts, etc. The specific circumstances for your presentation will determine whether a legal review is necessary. If you (as the author) or your supervisor check "NO" in block 17 of the Form 3039, your research or technical documents will not be forwarded to the 502 ISG/JAC legal office for an ethics review. To assist you in making this decision about whether to request a legal review, the following examples are provided as a guideline:

For presentations before professional societies and like organizations, the 59 MDW Public Affairs Office (PAO) will provide the needed review to ensure proper disclaimers are included and the subject matter of the presentation does not create any cause for DoD concern.

If the sponsor of a conference or meeting is a DoD entity, an ethics review of your presentation is not required, since the DoD entity is responsible to obtain all approvals for the event.

If the sponsor of a conference or meeting is a non-DoD commercial entity or an entity seeking to do business with the government, then your presentation should have an ethics review.

If your travel is being paid for (in whole or in part) by a non-Federal entity (someone other than the government), a legal ethics review is needed. These requests for legal review should come through the 59 MDW Gifts and Grants Office to 502 ISG/JAC.

If you are receiving an honorarium or payment for speaking, a legal ethics review is required.

If you (as the author) or your supervisor check "YES" in block 17 of the Form 3039, your research or technical documents will be forwarded simultaneously to the 502 ISG/JAC legal office and PAO for review to help reduce turn-around time. If you have any questions regarding legal reviews, please contact the legal office at (210) 671-5795/3365, DSN 473.

NOTE: All abstracts, papers, posters, etc., should contain the following disclaimer statement:

"The views expressed are those of the [author(s)] [presenter(s)] and do not reflect the official views or policy of the Department of Defense or its Components"

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"The voluntary, fully informed consent of the subjects used in this research was obtained as required by 32 CFR 219 and DODI 3216.02_AFI 40-402."

NOTE: All abstracts, papers, posters, etc., should contain the following disclaimer statement for research involving animals, as required by AFMAN 40-401_IP:

"The experiments reported herein were conducted according to the principles set forth in the National Institute of Health Publication No. 80-23, Guide for the Care and Use of Laboratory Animals and the Animal Welfare Act of 1966, as amended."